

Software Enabled Therapeutics for Psychiatry, Neurology, and Pain

Completed Technology Project (2014 - 2015)



Project Introduction

The overarching goal of the project was to develop a server-based platform linked to five digital eHealth interventions that work synergistically with psychoactive medications to address anxiety, depression, and cognitive function, as well as several other CNS indications such as sleep disorders. The project accomplished all of the design and development goals, and is currently undergoing user testing and iterative refinement. The main results of the project are as follows: 1) Five eHealth apps were developed to address problems identified as risks during extended spaceflight, including anxiety, depression, diminished cognitive function, and sleep dysfunction. 2) A server-based platform was developed to coordinate and manage the eHealth apps, and to provide the analytics required to manage digital health therapy used in combination with pharmaceutical intervention. 3) In addition to providing effective interventions, the apps and platform support the collection and analysis of real-time behavioral and biometric data, and can use this information to dynamically adjust interventions. 4) The system provides an extended analysis and reporting capability, and can support all aspects of intervention management and basic research.

Anticipated Benefits

The eHealth systems and paradigms developed for this project have significant clinical value beyond use in Spaceflight. The project fostered the development of the PEAR eFormulation System -- a digital eHealth system that combines behavioral medicine / CNS focused digital health apps with pharmaceutical interventions, including biometric and behavioral measurements. The resulting system provides dynamic management of interventions and protocols via a server-based predictive analytics platform. The current system is focused on the problems of anxiety, depression, cognitive function, and sleep disorders. However, the PEAR System can be extended to address other significant problems in behavioral medicine, mental health, and CNS disease, including: substance abuse, weight management, hypertension, pain management, Post Traumatic Stress Disorder, Traumatic Brain Injury, stroke, schizophrenia, and others. Few new therapies are set to come to market for these diseases, as drug development has been extremely difficult and time consuming, with many late phase and high profile clinical failures. eHealth and pharmaceutical combinations impact both brain chemistry and cognitive experience simultaneously, providing a synergistic approach to addressing clinical problems in behavioral medicine, mental health, and CNS disease. The PEAR System pioneers the way for a new-generation of integrated therapeutic approaches, and affords a pathway for providing more effective interventions at a lower cost, and with enhanced clinical efficacy. In this manner the current project addresses a significant societal problem: our healthcare system urgently requires next generation therapeutics that provide enhanced clinical safety and efficacy – interventions that are clinically effective and can reduce the overall cost of mental health care. This need is particularly acute with



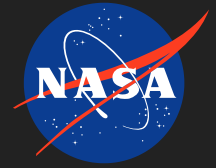
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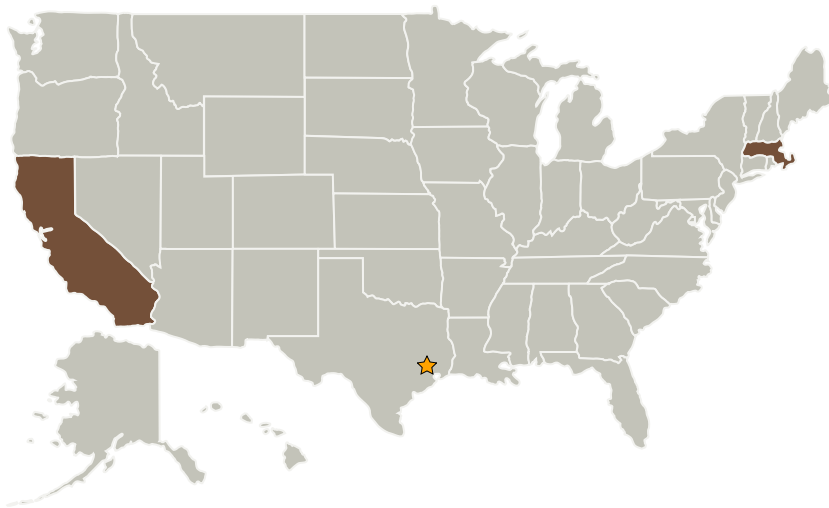
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regard to new therapies and preventive approaches in the field of behavioral medicine, mental health, and CNS disease. The US currently spends ~ \$1.3 Trillion per year on brain-related diseases. Yet 80% of the world population is currently unserved or underserved. Few new therapies are set to come to market for CNS related diseases as drug development has been extremely difficult and time consuming, with many late phase and high profile clinical failures. Combining digital eHealth applications with pharmaceutical interventions generates improved clinical results, promotes adherence and compliance, and provides a reimbursement mechanism to promote adoption.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Pear Therapeutics, Inc.	Supporting Organization	Industry	

Primary U.S. Work Locations

California	Massachusetts
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Organizational Responsibility

Responsible Mission Directorate:

Space Operations Mission Directorate (SOMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Human Spaceflight Capabilities

Project Management

Program Director:

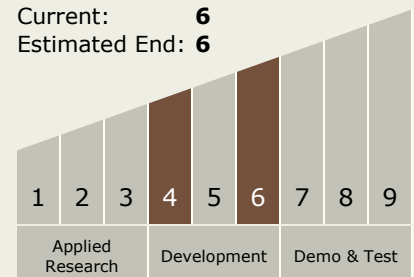
David K Baumann

Principal Investigator:

Corey M Mccann

Technology Maturity (TRL)

Start: 4
Current: 6
Estimated End: 6




Technology Areas


Primary:

Continued on following page.



Project Transitions

 **August 2014:** Project Start

 **July 2015:** Closed out

Closeout Summary: The overarching goal of the project was to develop a server-based platform linked to five digital eHealth interventions that work synergistically with psychoactive medications to address anxiety, depression, and cognitive function, as well as several other CNS indications such as sleep disorders. The project accomplished all of the design and development goals, and is currently undergoing user testing and iterative refinement. The main results of the project are as follows: 1) Five eHealth apps were developed to address problems identified as risks during extended spaceflight, including anxiety, depression, diminished cognitive function, and sleep dysfunction. 2) A server-based platform was developed to coordinate and manage the eHealth apps, and to provide the analytics required to manage digital health therapy used in combination with pharmaceutical intervention. 3) In addition to providing effective interventions, the apps and platform support the collection and analysis of real-time behavioral and biometric data, and can use this information to dynamically adjust interventions. 4) The system provides an extended analysis and reporting capability, and can support all aspects of intervention management and basic research.

Project Website:

<https://taskbook.nasaprs.com>

Technology Areas (cont.)

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.3 Human Health and Performance
 - └ TX06.3.3 Behavioral Health and Performance

Target Destinations The Moon, Mars